Warm Neutral Halos around Molecular Clouds: Dust Emission

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Interstellar molecular clouds are surrounded by atomic halos. The evolution of the clouds depends on the interchange of energy anti mass across the boundary layers, into or out of the cloud halos. A multi-faceted study of molecular cloud halos, using data derived from observations at centimeter, millimeter, infrared and optical wavelengths is being conducted, in order to study the distributions of dust, atoms and molecules across the cloud edges (e.g. Andersson and Wannier **1993,** ApJ, 402, 585; Wannier et al, 1991, ApJ Suppl. 75, 987). In particular, wc have acquired data on line emission from molecules (including CO, ^{13}CO, and 011) and HI along a large number of strips crossing the boundary layers of 18 molecular clouds.

Dust grains play a vital role in cloud evolution, firstly by extinguishing the interstellar ionizing UV radiation impacting the cloud, and secondly by providing catalytic surfaces for chemical reactions (primarily H_2 formation), which affect the molecular abundances in the cloud, We have undertaken an analysis of the IRAS data for the cloud edges in our data-base, in order to derive the temperature and column density of dust across the cloud boundaries. The longest wavelength (100 μm) band emission is primarily sensitive to the temperatures of large grains, while the shorter wavelength bands (12 and 25 pm) probe the non-equilibrium emission from the transient heating of very small grains (Beichman et al. 1988, ApJ, 332, 1.81). The dust column density estimates from the IRAS data will be compared with the results derived from optical *uvby* photometry (Andersson, Petterson and Wannier 1993, in preparation). Since gas in the cloud edges is thought to be heated primarily by grain photoelectric heating, the dust properties derived from the IRAS data will provide a crucial input to self-consistent models of the cloud halos. Preliminary results wiii be presented for the dust densities and temperatures, and their correlation with the properties of the molecular and atomic components, for a selected number of cloud edges.

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